

# 1 BELT FOR FEEDBACK DURING ABDOMINAL CORE MUSCLE EXERCISE

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## 3 BACKGROUND OF THE INVENTION

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### 5 1. Field of the Invention

6 This invention relates broadly to exercise equipment.  
7 More particularly, this invention relates to a belt having  
8 an inflatable bladder and a feedback mechanism to indicate  
9 to the user when the pressure in the bladder is altered by  
10 activation of the abdominal transverse muscle region.

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### 12 2. State of the Art

13 Pilates is an exercise method that improves muscle  
14 control, flexibility, coordination, strength and tone  
15 through physical and neurological mental conditioning. It  
16 works on deep (or core) abdominal muscles and the spine,  
17 the most important structure in the body and the source of  
18 the nervous system. It is a fitness regime that combines  
19 stretching and strengthening exercises designed to work the  
20 entire body in fluid movements.

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22 In accord with one significant pilates exercise, the  
23 participant, while preferably in a proprioceptive

1 environment, draws in the muscles of the transverse abdomen  
2 and holds the muscular state for a period of time. It is  
3 preferable that the spine be in a close to neutral posture  
4 during the exercise. Otherwise, such abnormality in  
5 posture can cause deviation from the intended results.

6  
7 Moreover, it is often difficult for the participant to  
8 know whether the exercise is being performed properly.  
9 Particularly with pilates-type abdominal exercises, it is  
10 essential that the abdominal muscles be drawn in toward the  
11 spine, in distinction from simply 'sucking in' the stomach.  
12 The lack of proper feedback as to whether the exercise is  
13 being done properly is one reason it is very difficult to  
14 teach and learn several exercises which are part of the  
15 pilates method.

#### 16 17 SUMMARY OF THE INVENTION

18  
19 It is therefore an object of the invention to provide  
20 a device which assists a user in performing abdominal core  
21 muscle exercises.

1       It is another object of the invention to provide a  
2 device which provides feedback to a user that an exercise  
3 is being properly performed, while the user maintains  
4 desired posture, such as during a pilates exercise.

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6       In accord with these objects, which will be discussed  
7 in detail below, a belt is provided with an inflatable  
8 bladder which, when inflated, is permitted to expand toward  
9 an interior space circumscribed by the belt and prevented  
10 by a barrier from expanding toward an exterior of the belt.  
11 The bladder is coupled by a short tube to an inflation bulb  
12 and a pressure gauge which indicates the pressure within  
13 the bladder. In accord with a preferred embodiment of the  
14 invention, the gauge is coupled to the belt and displaced  
15 relative thereto such that it may be viewed by a user  
16 (without use of the user's hands) when the belt is worn  
17 without significantly moving the cervical spine  
18 substantially out of a neutral posture. The displacement  
19 may be effected by use of bracket, a portion of which may  
20 be received in a pocket of the belt. The bracket may fold  
21 at a hinge to permit the belt and gauge to be collapsed  
22 together into a compact configuration for storage or  
23 travel.

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2       In use, the belt is snugly worn with the inflatable  
3 bladder positioned against the abdominal muscles, in  
4 distinction from directly over the stomach. The bulb is  
5 activated to inflate the bladder, e.g. to 80 to 90 psi,  
6 such that pressure is placed against the abdomen. While  
7 maintaining a posture in which the cervical spine is in a  
8 substantially neutral posture, the transverse abdominal  
9 muscles are drawn in and held for a period of time. As  
10 feedback that the muscles of the abdomen are being  
11 activated, the user can see the gauge which is positioned  
12 at a location which can be seen without significantly  
13 moving the head from the neutral position. If the exercise  
14 is being performed properly, the gauge indicates a pressure  
15 decrease while the muscles of the abdomen are drawn in, and  
16 a return to the previous pressure once the muscles are  
17 relaxed. The pressure decrease does not occur if 'draw in'  
18 is performed improperly, i.e., if the stomach is 'sucked  
19 in', but the muscles are not properly drawn in.

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21       In accord with various embodiments, other attachment  
22 means may be used to couple the gauge relative to the user  
23 so that the user may view the gauge during the exercise

1 without use of the user's hands while maintaining proper  
2 physiological positioning. Furthermore, other feedback  
3 means may be used, such as sounds and/or lights that  
4 indicate to the user the pressure drop which occurs during  
5 a properly performed pilates-type abdominal exercise.

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7 Additional objects and advantages of the invention  
8 will become apparent to those skilled in the art upon  
9 reference to the detailed description taken in conjunction  
10 with the provided figures.

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12 BRIEF DESCRIPTION OF THE DRAWINGS

13  
14 Fig. 1 is a side elevation of an exterior of an  
15 exercise belt according to the invention, with an inflation  
16 bulb provided an external pocket;

17  
18 Fig. 2 is a side elevation of an interior of an  
19 exercise belt according to the invention;

20  
21 Fig. 3 is a schematic section view generally across line 3-  
22 3 in Fig. 2, with an inflatable bladder in an non-inflated  
23 state;

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2        Fig. 4 is a view similar to Fig. 3, with the  
3        inflatable bladder in an inflated state;

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5        Fig. 5 is a view similar to Fig. 3 of an alternate  
6        embodiment of the invention; and

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8        Fig. 6 is a section view showing the embodiment of  
9        Fig. 5 in a collapsed configuration.

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#### 11        DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

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13        Turning now to Figs. 1 and 2, a belt 10 includes an  
14        inner side 12, intended to be positioned against the user's  
15        body, and an outer side 14, intended to be positioned away  
16        from the user's body. The belt 10 may be made from fabric  
17        including pack cloth, leather, synthetic sheeting, or other  
18        material which will substantially conform to and maintain  
19        its girth when adjusted about the user. The belt may be  
20        elastic, inelastic, or a combination of such materials such  
21        that it is preferably readily adjustable in size about the  
22        user's waist in manners well known in the art, e.g., using  
23        hook and loop fasteners 16 and 18, or a buckle.

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2       The inner side 12 includes a first pocket 20  
3   constructed of an elastic material, such as neoprene. An  
4   inflatable bladder 22 is provided in the pocket 20. The  
5   bladder 22 is coupled to an actuation bulb 24 by a short  
6   length of tubing 25, e.g., 6 to 8 inches, the relatively  
7   short length of which increases the responsiveness of the  
8   bulb 24 in inflating the bladder 22. The bladder 22 is  
9   also coupled to a pressure gauge 26 by tubing 28. Gauge 26  
10   indicates the pressure within the bladder 22. Tubings 25,  
11   28 extend through the pocket 20 preferably at a reinforced  
12   location, such as a leather or durable fabric overlay 29.

13

14       The gauge 26 is mounted on an L-shaped bracket 30  
15   defining vertical and horizontal arms, 32, 34,  
16   respectively. Particularly, the gauge 26 is mounted at the  
17   end 37 of the horizontal arm 32 with the face 38 of the  
18   gauge directed upwards. The horizontal arm 32 may in fact  
19   be angled relative to the horizontal, but provides outward  
20   displacement of the gauge 26 relative to the belt, as  
21   discussed further below.

22

1        Referring to Figs. 1 and 3, the belt 10 preferably  
2 includes a second pocket 36 which preferably overlies the  
3 first pocket 20 and which is preferably located on the  
4 outer side 14 of the belt. The second pocket 36 is  
5 constructed of material 40 which is preferably inelastic.  
6 The vertical arm 32 of the bracket 30 is positioned within  
7 the second pocket 36. The horizontal arm 34 fixedly  
8 displaces the gauge 26 outward from the outer side 14 of  
9 the belt 10 such that, when the belt is worn, it may be  
10 viewed by the user without the user moving the cervical  
11 spine substantially out of a neutral posture. In one  
12 preferred embodiment, the horizontal arm is approximately  
13 five to eight inches in length, although substantially  
14 longer lengths, e.g., up to twelve to eighteen inches may  
15 be used. The L-shaped bracket 30 may be right angled, or  
16 even at an obtuse angle such that the face 38 of the gauge  
17 26 is more easily viewed by the user.

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19        A stiff barrier plate 44, e.g., of plastic, metal,  
20 leather, heavy fabric, etc., can additionally be positioned  
21 in the pocket 36. One or both of the vertical arm 32 and  
22 the barrier 44 function as a stop to prevent the inflated  
23 bladder 22 from expanding into the belt 10. The barrier 44

1 is especially preferred if the vertical arm 32 and bladder  
2 22 are laterally offset from each other. The barrier 44 is  
3 particularly not required if the vertical arm 32 is of  
4 substantial stiffness and dimension to constrain movement  
5 of the bladder 22 in the direction of the vertical arm, as  
6 discussed below.

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8       Alternatively, the second pocket 36 can be provided at  
9 the inner side 12 of the belt 10, between the first pocket  
10 20 and the belt 10. As yet another alternative, no second  
11 pocket 36 is required and the vertical arm 32 and barrier  
12 44, if provided, may be positioned in the first pocket 20,  
13 between the bladder 22 and the belt 10.

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15       The outer side 14 of the belt 10 is provided with a  
16 preferably elastic third pocket 42 into which the bulb 24  
17 may be stored when not being activated to inflate the  
18 bladder 22.

19  
20       Referring to Fig. 4, when the bladder 22 is inflated  
21 by actuation of the bulb 24, the bladder 22 is permitted to  
22 expand away from the inner side 12 of the belt 10 and  
23 prevented by the stiffness of the vertical arm 32 and/or

1 barrier 44 from expanding into the belt. That is, the  
2 entire expansion of the bladder 22 occurs toward a space an  
3 inner side 12 of the belt 10 without distension of the belt  
4 10.

5  
6 In use, the belt 10 is snugly worn with the bladder 22  
7 positioned against the abdominal wall muscles, in  
8 distinction from directly over the umbilicus. The bulb 24  
9 is activated (pumped) to inflate the bladder 22, e.g. to 80  
10 to 90 psi (i.e., to the expanded state shown in Fig. 4).  
11 The material defining pocket 20 expands with the bladder 22  
12 and retains the bladder even as the bladder is inflated.  
13 Once inflated, the bladder 22 places pressure against the  
14 abdominal wall muscles.

15  
16 While maintaining a standing posture or lying in a  
17 supine position in which the cervical spine is in a  
18 substantially neutral posture and while subject to the  
19 pressure of the bladder 22, the muscles of the abdomen are  
20 drawn in and held for a period of time, e.g., five to ten  
21 second, and then released. The exercise is repeated  
22 several times for maximum benefit.

23

1        If the exercise is being performed properly, the gauge  
2 26 indicates a pressure decrease while the muscles of the  
3 transverse abdomen are drawn in, and a return to the  
4 previous pressure once the muscles are relaxed. The  
5 pressure decrease does not occur if 'drawn in' is performed  
6 improperly, i.e., if the stomach is 'sucked in' and the  
7 muscles are not properly drawn in. In order to provide  
8 useful feedback that the transverse abdominal muscle region  
9 is properly being activated, the user can see the face 38  
10 of the gauge 26 which is fixedly displaced outward from the  
11 user's body at a location which can be seen without  
12 significantly moving the user's head from the cervically  
13 neutral position.

14

15        Turning now to Fig. 5, another embodiment of a belt  
16 110 is shown with an alternate bracket 130, which includes  
17 a hinge 144. The vertical and horizontal components 132,  
18 134 of the bracket 130 can rotate about the hinge 144. The  
19 hinge 144 is designed with a stop that allows the bracket  
20 to stay open at approximately between 90° and 120°, and  
21 also permits rotation thereabout to fold into a more  
22 compact configuration for storage or travel, as shown in  
23 Fig. 6.

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2       From the above, it is appreciated that other  
3 attachment or mounting means may be used to couple the  
4 gauge in a relatively fixed position relative to the user  
5 (without use of the user's hands) so that the user may view  
6 the face of the gauge during exercise while maintaining  
7 proper cervical positioning. By way of example and not by  
8 limitation, an articulable gooseneck may be used between  
9 the belt and the gauge. Furthermore, the gauge may be  
10 relatively fixedly coupled outwardly from the user's body  
11 at a location other than the belt. For example, the gauge  
12 may be coupled to a neck brace which places the gauge  
13 substantially closer the user's eyes. By way of another  
14 example, the gauge may be coupled to a foot or shoe  
15 attachment which places the gauge further at a distance  
16 from the body or face and/or at a relatively vertically  
17 higher location to facilitate visual inspection. In  
18 addition, the gauge may be attached to an arm band in a  
19 manner that the gauge is visible by the user when the arm  
20 is in a neutral position against the body.

21

22       Furthermore, other feedback means, in addition to or  
23 as an alternate to the pressure gauge 26, may be used which

1 additionally provides feedback to the user that pressure  
2 has dropped in the bladder and thus the 'draw in' is being  
3 properly performed. For example, audible indicators or  
4 visual indicators, e.g., lights such as LEDs which are  
5 highly visible even from peripheral vision, can be used to  
6 indicate the desired pressure drop when the exercise is  
7 being properly performed.

8  
9       There have been described and illustrated herein  
10 embodiments of an exercise belt for performing an abdominal  
11 exercise. While particular embodiments of the invention  
12 have been described, it is not intended that the invention  
13 be limited thereto, as it is intended that the invention be  
14 as broad in scope as the art will allow and that the  
15 specification be read likewise. It will therefore be  
16 appreciated by those skilled in the art that yet other  
17 modifications could be made to the provided invention  
18 without deviating from its spirit and scope as claimed.

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